

CLAIMS

1. An information recording apparatus comprising:

a writing device (i) capable of writing, with respect to a disc-shaped
5 information recording medium in which at least first and second recording
layers making a pair are laminated and in which a buffer area to prevent a
recording or reproduction position for the first and second recording layers
from being off to an unrecorded area is disposed in a position adjacent to a
recording area in the first and second recording layers, a first portion out of
10 information to be recorded into the first recording layer along a first track
path directing from one side to the other side out of an inner circumferential
side and an outer circumferential side of the information recording medium,
and (ii) capable of writing a second portion out of the information to be
recorded into the second recording layer, with a recording direction reversed,
15 along a second track path directing from the other side to the one side; and

a controlling device for controlling said writing device (I) to write the
first portion into the first recording layer along the first track path, and then
write a predetermined amount of first buffer data into the first recording
layer along the first track path in one portion of the buffer area of the first
20 recording layer, and also perform layer jump from the first recording layer to
the second recording layer, and then (II) to write a predetermined amount of
second buffer data into the second recording layer along the second track path
in one portion of the buffer area of the second recording layer, and then write
the second portion into the second recording layer along the second track
25 path.

2. The information recording apparatus according to claim 1, wherein
said controlling device controls said writing device to end writing of the
predetermined amount of first buffer data into the first recording layer, in a
predetermined recording unit including a physical address, in the one portion
5 of the buffer area of the first recording layer.

3. The information recording apparatus according to claim 2, wherein
said controlling device controls said writing device to start writing of the
predetermined amount of second buffer data into the second recording layer,
10 from a predetermined recording unit including a correspondence address in
the one portion of the buffer area of the second recording layer corresponding
to the physical address.

4. The information recording apparatus according to claim 3, wherein
15 said controlling device controls said writing device to search for the
correspondence address after the writing of the predetermined amount of first
buffer data into the first recording layer, and to write the predetermined
amount of second buffer data on the basis of the searched correspondence
address.

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5. The information recording apparatus according to claim 2, wherein
said controlling device controls said writing device to start writing of the
predetermined amount of second buffer data into the second recording layer,
from a predetermined recording unit including a quasi-correspondence
25 address which is supposed to be located on the one side of a correspondence
address in the one portion of the buffer area of the second recording layer

corresponding to the physical address.

6. The information recording apparatus according to claim 5, wherein
said controlling device controls said writing device to search for the
5 quasi-correspondence address after the writing of the predetermined amount
of first buffer data into the first recording layer, and to write the
predetermined amount of second buffer data on the basis of the searched
quasi-correspondence address.

10 7. The information recording apparatus according to claim 2, wherein
said controlling device controls said writing device to start writing of the
predetermined amount of second buffer data into the second recording layer,
from a predetermined recording unit including a firstly recognized address.

15 8. The information recording apparatus according to claim 7, wherein
said controlling device controls said writing device to write the firstly
recognized address into a predetermined area in at least one of the first and
second recording layers.

20 9. The information recording apparatus according to claim 7, wherein
said controlling device controls said writing device to write a last address
where recording is ended in the one portion of the buffer area of the first
recording layer, into a predetermined area in at least one of the first and
second recording layers.

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10. The information recording apparatus according to claim 1, wherein

said controlling device controls said writing device to further write the first buffer data in order to fill up another portion of the first buffer area and to further write the second buffer data in order to fill up another portion of the second buffer area, after writing of the second portion into the second recording layer is completed.

11. The information recording apparatus according to claim 1, wherein said controlling device controls said writing device to start recording of the first portion from a portion of the first recording layer continued from a lead-in area of the information recording medium, and to write information for forming a lead-out area on the one side of a recording end position of the second recording layer, after writing of the second portion into the second recording layer is completed.

12. The information recording apparatus according to claim 1, wherein said writing device can optically write the first and second portions by irradiating laser light,

the second recording layer is located on a rear side of the first recording layer as viewed from an irradiation direction of the laser light, and said controlling device controls said writing device to perform layer focus jump from the first recording layer to the second recording layer, as the layer jump.

13. An information recording / reproducing apparatus, comprising:
the information recording apparatus according to claim 3, and further comprising:

a reading device capable of reading the first and second portions from the first and second recording layers; and

a reproducing device for reproducing the read first and second portions,

5 said controlling device controlling said reading device (I) to read the first portion from the first recording layer along the first track path, and then read the predetermined amount of first buffer data in the one portion of the buffer area of the first recording layer, and then (II) to search for any one of addresses out of the correspondence address, the quasi-correspondence
10 address, and the firstly recognized address, while reading the predetermined amount of second buffer data in the one portion of the buffer area of the second recording layer, and then start reading of the second portion along the second track path on the basis of the searched address, and controls said reproducing device to reproduce the read first and second portions.

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14. An information recording method in an information recording apparatus comprising: a writing device (i) capable of writing, with respect to a disc-shaped information recording medium in which at least first and second recording layers making a pair are laminated and in which a buffer area to
20 prevent a recording or reproduction position for the first and second recording layers from being off to an unrecorded area is disposed in a position adjacent to a recording area in the first and second recording layers, a first portion out of information to be recorded into the first recording layer along a first track path directing from one side to the other side out of an inner circumferential
25 side and an outer circumferential side of the information recording medium, and (ii) capable of writing a second portion out of the information to be

recorded into the second recording layer, with a recording direction reversed,
along a second track path directing from the other side to the one side,

said information recording method comprising:

a controlling process of controlling said writing device (I) to write the
5 first portion into the first recording layer along the first track path, and then
write a predetermined amount of first buffer data into the first recording
layer along the first track path in one portion of the buffer area of the first
recording layer, and also perform layer jump from the first recording layer to
the second recording layer, and then (II) to write a predetermined amount of
10 second buffer data into the second recording layer along the second track path
in one portion of the buffer area of the second recording layer, and then write
the second portion into the second recording layer along the second track
path.

15 15. An information recording / reproducing method in an information
recording / reproducing apparatus, comprising: the information recording
apparatus according to claim 3, and further comprising: reading device
capable of reading the first and second portions from the first and second
recording layers; and a reproducing device for reproducing the read first and
20 second portions,

said information recording / reproducing method comprising:

a controlling process of controlling said reading device (I) to read the
first portion from the first recording layer along the first track path, and then
read the predetermined amount of first buffer data in the one portion of the
25 buffer area of the first recording layer, and then (II) to search for any one of
addresses out of the correspondence address, the quasi-correspondence

address, and the firstly recognized address, while reading the predetermined amount of second buffer data in the one portion of the buffer area of the second recording layer, and then start reading of the second portion along the second track path on the basis of the searched address.

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16. A computer program of instructions for recording control and for tangibly embodying a program of instructions executable by a computer provided in the information recording apparatus according to claim 1, to make the computer function as at least one portion of said controlling device

10 and said writing device.